

Abstract

A single-photon generator for generating a single photon with high efficiency at a constant frequency. A CW semiconductor laser (1) emits a laser beam of wavelength 780nm. A photon of wavelength 780nm is divided into two photons of wavelengths 1550 and 1570nm by means of a non-degenerate waveguide PPLN (2). A dichroic mirror (6) separates the two photons. A gate-operation single-photon detector (4) detects one of the photons and generates a detection signal. An LN polarization modulator is operated with the detection signal. An optical switch (5) composed of the LN polarization modulator and a polarized beam splitter rotates the polarization of the other photon by 90° and outputs the photon in a given direction. With this, only one photon can be taken out in the direction of the travel at a frequency of several hundreds of kilohertz. Two photons of different wavelengths are produced by spontaneous parametric down-conversion by a non-degenerate waveguide PPLN, the photons are separated by a dichroic mirror, one of the photons is detected by a gate-operation single-photon detector, and the output of the other photon is controlled by a high-speed LN polarization modulator. Therefore, a single photon can be efficiently produced at a constant frequency.